CHAPTER I

INTRODUCTION

1.1 Introduction

The management of waste generated from rubber tires is becoming a major environmental problem throughout the world. Rubber-tire-waste represents one of several special types of waste that is difficult for municipalities to handle. The same characteristics that make them desirable as tires, such as long life and durability, makes their disposal almost impossible. Adding to the problem is the fact that tires are thermoset, which means that they cannot be melted and separated into their chemical components. In addition, tires are also virtually immune to biological degradation [1].

Several approaches have been proposed to deal with the problem of used tires. Retreading of retreadable used tires or recovering a tire's energy through the use of Tire Derived Fuel (TDF) in solid fuel burners, such as cement or lime kilns, are obvious examples of the reclamation process. Other approaches are using pyrolysis to recover valuable chemical components [2], incorporation in various non-rubber tire applications and as fillers/toughenerers in plastic [3].

Toughening of thermoplastics such as polypropylene (PP) with used tires has also been considered. This is because PP has a most remarkable combination of various physical properties and processability; however, it has poor impact strength, especially at low temperature, due to its high glass-transition temperature and high crystallinity [4,5]. A significant way to improve the strength of PP is to blend it with various elastomers. However, due to the chemically dissimilar structure of these two

polymers, phase separation is generally larger than the optimum, and interfacial bonding is poor in their physical blends. Therefore, dynamic crosslinking of blending with peroxide, maleic anhydride and sulfur has been introduced to the system to form interpolymers [6].

1.2 Objective

The focus of this study is on the improvement of the impact strength of polypropylene (PP) by blending with either one of two types of recycled tire-rubber, reclaimed tire-rubber (RTR) and ground rubber tire (GRT).

1.3 Scope of the Research

The scope of this research work involves the preparation of polypropylene (PP)/reclaimed tire-rubber (RTR) blends at various ratios using a two-roll mill, then a counter-rotating twin screw extruder as the tools for mixing. The sulfur crosslinking agents and maleic anhydride (MA)/dicumyl peroxide (DCP) were used for crosslink these composites. The effect of GRT particle size at three different mesh size, 8, 16 and 40 mesh of PP/GRT blend with sulfur crosslinking agents by the same manner on impact strength were observed.

Investigation of the notch-Izod impact strength of the blends was performed, according to ASTM D 256 and their morphology, using SEM techniques was also observed. In addition, the rheological properties, e.g. melt flow index (MFI), according to ASTM D 1238, thermal properties, measured by DSC to obtain the percentage crystallinity, the onset temperature and melting temperature, recorded for the argument of notch-Izod impact strength. Finally, summarizing and analysis of these results.